



Low Concentration Portable Dissolved Oxygen Meter MODEL DO-32A

- Please keep this instruction manual close at hand of the persons who are in charge of the operation of this product.
- Before operating this product, please read this instruction manual carefully for its correct handling.

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Warranty

(1) Warranty Coverage

DKK-TOA Corporation (DKK-TOA) warrants its products against defective material or workmanship for the warranty period.

- (a) The warranty period is one year from the date of delivery to the original user. If the date of delivery cannot be specified, the warranty period is 24 months from the month following the date of manufacture shown on the product nameplate.
- (b) Specific written agreements with DKK-TOA, if any, shall take precedence over this warranty.
- (c) The limitation of warranty described herein may not apply where applicable laws do not allow such limitation.

(2) Limited Warranty

This warranty does not cover the cases listed below.

- (a) Direct or indirect failure or damage caused by the use of the product for a purpose or in a manner not prescribed by the specifications or the instruction manual for the product.
- (b) Direct or indirect failure or damage caused by force majeure, including but not limited to an act of God, natural disaster such as earthquake, storm and flood damage, and lightning, fire, accident, abnormal voltage, salt damage, gas damage, labor unrest, acts of war (declared or undeclared), terrorism, civil strife, or acts of any governmental jurisdiction.
- (c) Failure or damage caused by any repair or modification not authorized by DKK-TOA.
- (d) Failure or damage caused by the transport, moving, or dropping of the product after the purchase that is not attributable to DKK-TOA.
- (e) Electrodes and consumables (The warranty period for each part has priority when the period is shorter than that for the main unit of the product. If the customer requires any part after more than six months from the date of manufacture, consult DKK-TOA or its distributor.)
- (f) Failure or damage caused by the use of consumables, parts, or software not supplied by DKK-TOA.
- (g) Malfunctions or damage caused by the use of connecting equipment not supplied by DKK-TOA.
- (h) Loss of data, settings, programs, or software stored on the product not attributable to DKK-TOA.
- (i) Any product other than DKK-TOA's, if specified by the purchaser or user, that incorporates, or is incorporated into or combined with DKK-TOA's products (*1). In such cases, this warranty covers DKK-TOA's products only.
- (j) Any product not under proper maintenance in accordance with the instruction manual furnished by DKK-TOA.
- (k) Products without a nameplate (excluding products proved to have been delivered by DKK-TOA).

EXCEPT AS EXPRESSLY SET FORTH IN THE PRECEDING SENTENCES, DKK-TOA MAKES NO WARRANTY OF ANY KIND WHATSOEVER WITH RESPECT TO ANY PRODUCT. DKK-TOA EXPRESSLY DISCLAIMS ANY WARRANTY IMPLIED BY LAW, INCLUDING BUT NOT LIMITED TO ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

LIMITATION OF REMEDIES: In the event that a defect is discovered within the warranty period, DKK-TOA or its authorized distributor will, at its option, repair or replace the defective product or its part, or will refund the purchase price of the product. **THIS IS THE EXCLUSIVE REMEDY FOR ANY BREACH OF WARRANTY.**

LIMITATION OF DAMAGES: IN NO EVENT SHALL DKK-TOA BE LIABLE FOR ANY INCIDENTAL OR CONSEQUENTIAL DAMAGES OF ANY KIND FOR BREACH OF ANY WARRANTY, NEGLIGENCE, ON THE BASIS OF STRICT LIABILITY, OR OTHERWISE.

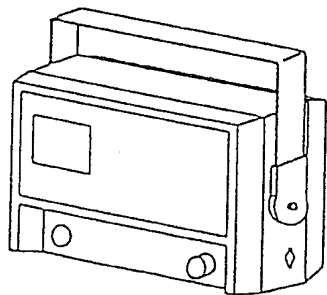
(3) Others

- (a) Product parts for maintenance (*2) will normally be supplied for five years (*3) from the date manufacturing and sales are discontinued.
- (b) The cause of any malfunction or damage shall be determined by a DKK-TOA technician.
- (c) For repairs, contact a local distributor in your country or state.

*1: Warranties for products from other companies must be maintained by the user.

*2: Maintenance parts refers to parts that are required to maintain operation of the product.

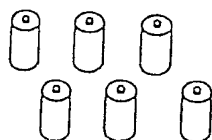
*3: This five-year period is subject to availability of parts or their replacement.



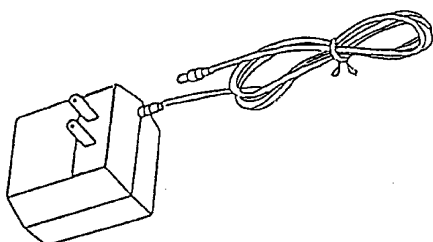
Main body 1 set

Dissolved oxygen electrode 1 pc.
(OE-584302)

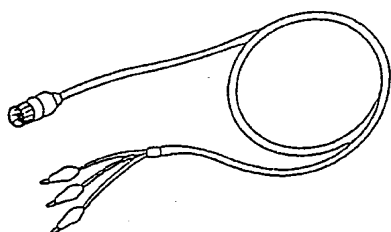
Flow cell 1 pc.
(DO-F-30)



Alkali batteries 6 pcs.
(R14, C size or UM-2)



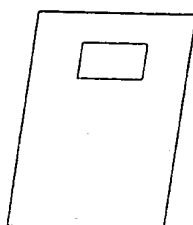
AC adapter 1 pc.
(YD-12)



Output cable 1 pc.
(DO-350L)

Shoulder belt 1 pc.
(124M062)

Carrying case 1 pc.
(7756510K)



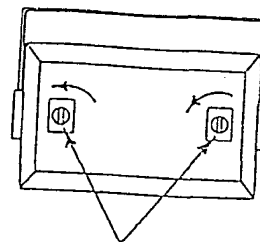
Instruction manual 1 copy

1. Handling cautions

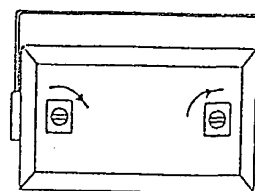
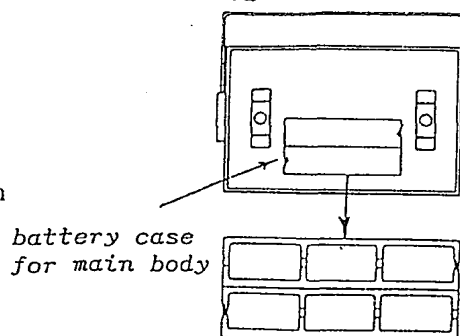
Pay attention to the following when handling the meter.

- 1) When used for the first time
Since the meter is shipped with batteries unloaded, load the attached batteries prior to commencing operation.

(R14, C size or UM-2)



1. Loosen the rear case cover mounting screw counterclockwise with a coin, then remove the cover.
2. Load the 6 batteries to the battery holder, paying attention to their polarities.
3. Close the rear case so that it correctly touches the packing, then turn the set screw while tightening the screw.



2) How to store electrodes

- (1) If the measurement stop period is less than 1 month

Leave the electrode plug connected to the main body, attach the electrode to the flow cell filled with sample solution or pure water, and turn off the power to the main body.

*The lower the dissolved oxygen concentration in the sample, the longer the lifetime of electrode will be.

- (2) If the measurement stop period is more than 1 month

Remove the electrode plug from the main body, wash the electrode thoroughly with pure water, and then store it in an electrode storage container containing a small amount (1 to 2 mL) of pure water.

- 3) When the electrode is immersed in a zero density dissolved oxygen solution including sodium sulfite, first fully wash the electrode with pure water, then immerse it in the fluid in the flow cell.

4) Electrode stabilization time

When replacing the electrolytic solution and membrane, it takes about 24 to 72 hours for the condition to stabilize.

The electrode becomes stable when connected to the main body and energized.

It takes about 12 hours for the device to stabilize after connecting electrode and main body.

In span calibration, if there is a temperature difference between the water temperature and the air temperature, it will take about an hour for the temperatures to become the same.

When calibrating with zero liquid, it usually takes about 24 hours for the value to stabilize after being immersed in the zero liquid.

*During zero calibration, a weak electrode output current (picoampere) is measured, so a zero calibration error may occur.

In this case, please calibrate several times until the error no longer occurs.

Electrical zero calibration is performed by removing the electrode from the main body.

If the electrode is sufficiently stabilized after being connected to the main body for more than 12 hours, and it is removed for only a few minutes, it will become stable again after about an hour has passed when it is connected to the main unit again.

If it has been removed for some time, it will take approximately 12 hours to stabilize.

5) When using a flow cell, please use the flow rate within the range of 0.05 to 2L/min.

6) Please use 1/4 inch tube (outer diameter 6.35mm) for the piping connected to the flow cell.

The recommended material is SUS.

In the case of resin, use one with as low oxygen permeability as possible, such as thick-walled Tygon tube (made of PVC).



Caution

Be careful with chemicals

- Be careful not to drink the electrolytic solution or get it in your eyes.
It is not a poisonous substance, but if it comes in contact with your skin, wash it off.
If it gets in your eyes, rinse immediately with plenty of water.
Please see a doctor if necessary.
- Safety Data Sheet (SDS) is available separately.
Electrolyte for Dissolved Oxygen Electrode R-6B No.E1001-7

2. Outline

Low concentration portable dissolved oxygen meter(DO-32A) is specialty for high-pressure boiler water feed line measurement at thermal and nuclear power plants and also for recent water resources development. It is also used to measure a very small amounts of oxygen dissolved in the feed water lines of desalination and metal corrosion test plants. The meter uses a membrane type dissolved oxygen electrode for dissolved oxygen measurement without contaminating the sample.

The meter's main features are as follows:

1. Dissolved oxygen density is digitally displayed, thereby ensuring achieving accurate reading by eliminating the reading error and incorrect reading caused by difference between individuals.
2. Four measuring ranges of 20 and 200 μ l g/l (ppb), and 2 and 20mg/l of full-scale along with dissolved oxygen in the order of 1 few μ g/l(ppb) can be measured with high accuracy due to the use of a built-in automatic temperature compensation function.
Measuring range can be selected either automatically or manually.
3. Meter span is calibrated in the atmosphere and its zero is calibrated electrically to facilitate calibration.
* As a guide, if the dissolved oxygen concentration of the sample is 1 μ g/L or more.
If the dissolved oxygen concentration is less than 1 μ g/L,
we recommend performing ZERO calibration with zero liquid.
4. The small flowcell is easy to operate and maintain.
Its drip-proof construction protects it from water splashes.
5. The electrode is of the polarographic membrane type, thereby achieving high response and long life.
6. The meter uses both AC and DC power sources and can therefore be operated in the field independent of AC power source.
* If using AC power in an environment other than 100V, a transformer is required.
7. Dissolved oxygen change can be continuously recorded with the recorder connected.

3. SPECIFICATIONS

MODEL		DO-32A
Measurement method		Membrane type polarographic method
Display		LCD digital display
Range	DO	0 ~ 19.99 μ g/L (ppb) 0 ~ 199.9 μ g/L (ppb) 0 ~ 1.999mg/L (ppm) 0 ~ 19.99mg/L (ppm)
	Temp.	0~45.0°C
Range changeover		Auto/manual
Displaying range	DO	0.01 μ g/L (0 ~ 19.99 μ g/L range) 0.1 μ g/L (0 ~ 199.9 μ g/L range) 0.001mg/L (0 ~ 1.999mg/L range) 0.01mg/L (0 ~ 19.99 mg/L range)
	Temp.	0.1°C
Repeatability (main body)	DO	$\pm 0.10 \mu$ g/L (0 ~ 19.99 μ g/L range) $\pm 0.3 \mu$ g/L (0 ~ 199.9 μ g/L range) ± 0.003 mg/L (0 ~ 1.999mg/L range) ± 0.03 mg/L (0 ~ 19.99mg/L range)
	Temp.	$\pm 0.5^\circ\text{C}$
Temp. compensation range		0 ~ 45°C, Automatic temp. compensation
Output for recorder	DO	0 ~ 1V (0 ~ F.S.on each range)
	Temp.	0 ~ 450mV (0 ~ 45°C)
	Range output	100mV (0 ~ 19.99 μ g/L range) 200mV (0 ~ 199.9 μ g/L range) 300mV (0 ~ 1.999mg/L range) 400mV (0 ~ 19.99mg/L range)
Ambient condition		0 ~ 45°C, 0 ~ 85%RH
Power source	AC	AC100V (with use of AC adapter)
	DC	Alkaline dry battery, R 14 x 6 pcs.
Dimensions of main body		Approx. 160(h) x 250(w) x 95(d)mm
Weight of main body		Approx. 2.1kgs.
Standard accessories		Flow cell (DO-F-30) 1 set Dissolved oxygen electrode (OE-584302) 1 pc. Dry battery (R 14, alkaline battery) 6 pcs. AC adapter (YD-12) 1 pc. Output cable (DO-350L) 1 pc. Shoulder belt (124M062) 1 pc. Carrying case (7756510K) 1 pc. Instruction manual 1 copy

4. Functional Description

4-1 Description of operation panel

1. POWER key Key to turn the power on or off.
When you turn on the power, the display will light up completely and the measured value will be displayed.
2. RANGE AUTO/MANU. key
Key to select auto-range or manual range
Every time this key is pressed, the range is changed in turn to auto and manual.
3. ↑ ↓ key Key to change the range at manual range
Pressing this key changes the range.
4. CAL. key Key to execute ZERO and SPAN calibration
5. CLEAR key By pressing this button while calibration is in progress, all recorded calibration data will be erased.
6. AUTO HOLD key
Key to hold the displayed value automatically when it becomes stable. During holding mode, the other keys than POWER key and AUTO HOLD one could not be operated.
Press this key again to escape from AUTO HOLD.
(Even during AUTO HOLD mode, if the DO value changes largely for a short time, it will be updated.)
7. L.S.D. ON/OFF key
Key is used when least significant digit is not used. The figure to round the L.S.D. is displayed.
8. ELECTRODE terminal
A receptacle to connect the electrode plug
9. OUTPUT terminal
A receptacle to connect the output cable
10. AC adapter connector
A connector for AC adapter.

* For the location of each key, refer to "7. External drawing" (P.14).

4-2 Preparation prior to measurement

(1) Power connection

When using the AC adapter, remove the AC ADP connector rubber cap on the meter side, then insert the plug of adapter into receptacle.

Make sure that the batteries are loaded for battery operation. When using the AC adapter, be sure to load the batteries for data back up.

* DO-32A does not have a data backup function.

If you replace the battery without connecting to the AC adapter, calibration data and settings will be erased.

(2) Electrode select switch setting

The switch is set to the (2) side prior to shipment.

When the standard electrode OE-584302 is used, be sure to leave the position as it is.

(3) Electrode mounting

Remove the holder cap on the flow cell.

Insert an O ring attached into the electrode, then the electrode into the electrode holder. Finally, tighten the holder cap screw.

Next, fix the electrode cable on the clamps of the flow cell. (see Fig.3-1 & 3-2 in the Page 9.)

Insert the electrode plug into the electrode connector receptacle so that it mates with the receptacle guide.

(4) Battery check

When the lamp of BATT. lights up, battery voltage may drop. Therefore, in this case, replace the batteries.

◆When using the AC adapter, "BATT" will not be displayed because the battery is not consumed.

* Please also refer to 5-4 "battery Replacement".

(5) Electrode stabilization

When the electrode is used for the first time or the electrolytic solution is changed or re-filled, connect the electrode to the meter, then leave it as it is until it stabilizes. (It takes about 12 hours.) Calibrate the meter, afterward.

When replacing the electrolytic solution and membrane, it takes about 24 to 72 hours for the condition to stabilize.

Please perform calibration and measurement after the electrode condition has stabilized.

4-3 Calibration

(1) ZERO calibration

There are two types of ZERO calibration:

electrical zero calibration and zero calibration using zero solution

Please do one of these.

Normally, there is no problem with performing only electrical zero calibration, but as a guide, when measuring samples of 1 μ g/L or less, we recommend calibration using zero solution.

[1] Electrical zero calibration

1. Pressing the RANGE AUTO/MANU. selects the range of AUTO. and disconnect the electrode from the meter.
2. Press the CAL key.
The CAL on the display section begins to turn on and off.
In a few seconds later, the buzzer sounds, then 0.00 μ g/l is displayed and the ZERO is displayed.
Electrical zero calibration is finished.

Electrical zero calibration is performed by removing the electrode from the main body.

If the electrode is sufficiently stabilized after being connected to the main body for more than 12 hours, and it is removed for only a few minutes, it will become stable again after about an hour has passed when it is connected to the main unit again.

If it has been removed for some time, it will take approximately 12 hours to stabilize.

[2] Calibration by zero solution

1. Connect the electrode to the meter and dip it into zero solution.
See page 10 Art.5-2 How to prepare zero solution.
2. Pressing RANGE AUTO.MANU. key selects the range of AUTO.
3. After the indication get stabilized near the zero, press the CAL. key. The CAL. begins to turn on and off, the buzzer sounds in a few seconds later, 0.00 μ g/l is displayed and the ZERO is displayed.
Zero calibration is finished with above procedure.

*During zero calibration, a weak electrode output current (picoampere) is measured, so a zero calibration error may occur.

In this case, please calibrate several times until the error no longer occurs.

(2) SPAN calibration (Calibration in the atmosphere)

1. Pressing the RANGE AUTO/MANU. key selects the range of AUTO.
2. Once the electrode is stable enough, remove the electrode from the holder, wipe off the waterdrop on the electrode with tissue paper, then leave it in the atmosphere for approx. 1 hour. Afterward, press the CAL. key. After the CAL. on the display section begins to turn on and off for a while, the buzzer sounds and both temperature and saturated dissolved oxygen amount at that temperature are displayed, then the SPAN is displayed. Span calibration in the atmosphere is finished with above procedure.

(3) Canceling calibration

When suspending the calibration, press the CAL. key again while CAL is turned on and off.

(4) Erasing of calibration value

When erasing the calibrated values, press the CLEAR key while CAL is turned on and off after pressing the CAL. key.
(ZERO and SPAN are distinguished.)

(5) Calibration error

During calibration, an error will be displayed in the following cases.

- The value is significantly outside the specified range.

An error will be displayed if the value is significantly different from 0 µg/L during zero calibration, or the value is significantly different from the saturated dissolved oxygen level during span calibration.

- The value fluctuates greatly.

If the change in value over a certain period of time is within a specified range, the calibration is complete.

If the value fluctuation is outside the specified range, calibration will continue for a while, but if it still does not fall within the specified range, an error will be displayed.

- * During zero calibration, a weak electrode output current (picoampere) is measured, so a zero calibration error may occur due to fluctuations in the value.

In this case, please calibrate several times until the error no longer occurs.

The error message will disappear if you perform calibration again and it completes successfully, or if you delete the calibration values.

4-4 Measurement

(1) Preparation

Properly locate the meter and flow cell.

Turn the select cock on the flow cell side to "DRAIN", then introduce measured water to the measured water inlet with a tube. (See Fig. 3-2)

(Drain off the waste water to a water way through a tube connected to the drain outlet.)

(2) Measurement

1. Press the RANGE AUTO/MANU. key to select the AUTO or MANU. and turn the select cock on the flow cell immediately to "MEASUREMENT".

(In the MANU. range, set the desired range by pressing \uparrow \downarrow key.)

If the measured value exceeds the upper limit value of each range, the display will flash at the upper limit value.

2. Flow the measured water through the flow cell for a while, and read the displayed value if it is stabilized.

Note: Use the flow cell at the flow range of 0.05 to 2 liter/min.

(3) Procedure after measurement

1. Turn the select cock immediately to "DRAIN". (See Fig. 3-2)
2. Disconnect the tubes connected to the measured water inlet and outlet and also turn the select cock to the center position. (See Fig. 3-2)
3. Turn the power off.

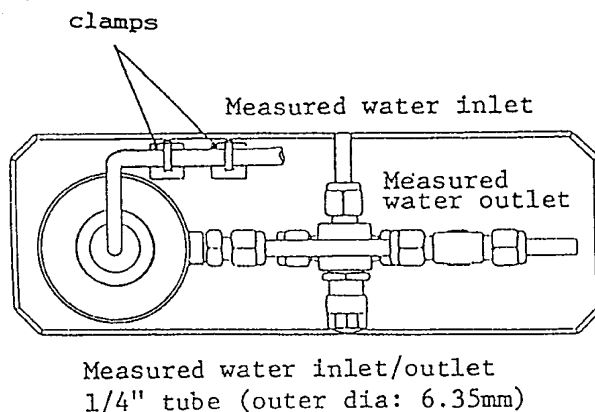


Fig. 3-1

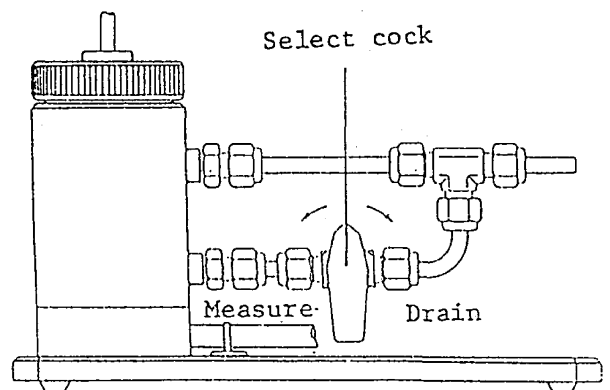
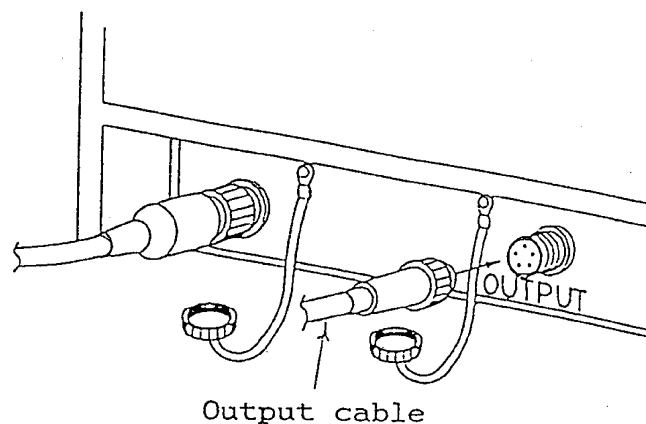


Fig. 3-2

4-5 Connection to analog recorder

1. Connect the output cable to the receptacle for recorder output.
2. Connect red, blue and yellow clip to + terminal of the recorder respectively and white and black one to - terminal.
3. Each measured value can be recorded.



Output cable

Color of clip	kind of output	output value
red	DO output	0 ~ 1V (0 ~ F.S.on each range)
blue	Temp. output	0 to 450mV (0 to 45 °C)
yellow	range output	100mV(0 to 19.99µg/l range) 200mV(0 to 199.9µg/l range) 300mV(0 to 1.999mg/l range) 400mV(0 to 19.99mg/l range)
white	COM	
black	COM	

5. Maintenance

5-1. Electrode calibration

Calibrate the DO electrode prior to or during use when necessary in accordance with item "CALIBRATION".
For continuous measurement, first calibrate the electrode about once every 2 weeks, then extend the period if necessary.
For measurement at low density range, calibration will be normally made once every 2 months.

5-2 Electrode operation check

Remove the electrode from the flow cell, then immerse it in the zero dissolved oxygen solution. The electrode is normal if the time required for arriving at 5ug/l (ppb) is within 15 minutes.

* 15 minutes is the time for performing an operation check.

In the case of zero calibration, please perform the calibration after about 24 hours have passed since immersion.

The membrane part and the temperature sensor part differ in the rate at which the temperature changes when immersed in a sample.

If the temperature of the sample in the flow cell and the solution with zero dissolved oxygen are different, a temperature difference will occur at each part of the electrode, causing a temporary peak in the indicated value around 0 µg/L (ppb).

This is due to the structure of the electrode and is not abnormal.

(Preparation of zero solution)

Pour 25ml of pure water into a 50ml beaker, then add sodium sulfite to the water to fully dissolve it, to obtain the zero solution. ◇1

Pour this solution into the electrode holder, then immerse the electrode into the solution to check the display at zero solution. When immersing the electrode into this solution, hold the holder aslant to prevent the attachment of air bubbles to the membrane because they may prevent zero showing on the display.

If zero solution is mixed by stirring or left for a long time, the DO value may increase. Therefore, prepare the solution every time it is used and use it at a standstill.

(Reference)

◇1 Pour pure water equal to about 1/2 the volume of the electrode holder (about 22ml) into the electrode holder, then add sodium sulfite equal to about 1/4 of the volume of the cap on the attached sodium sulfite container (about 2.2 g). Next, stir the solution with a glass rod to fully dissolved the sodium sulfite.

5-3 Electrode maintenance

Replacing the electrolytic solution

If a sample solution with a dissolved oxygen concentration of 10 mg/L (ppm) is continuously measured, it will need to be replaced after 6 months. For details on how to replace the electrolytic solution, please refer to "6. How to fill the electrolytic solution and replace the membrane."

Replacing the electrode

When used correctly, the electrode has a lifespan of over 1 year. If calibration is no longer possible, the response becomes extremely slow, or the indication with zero solution deviates significantly from "0", replace the membrane and electrolytic solution, and if it does not recover, replace the electrode with a new one.

Membrane dirt

If the membrane becomes dirty due to impurities in the sample, the sensitivity will decrease.

5-4 Battery replacement

If the BATT. mark appears in the displaying section when the meter is in service or the power is turned ON, the battery is dead and should be replaced immediately.

Six alkali batteries are used and are sufficient for about 400 hours of continuous operation.

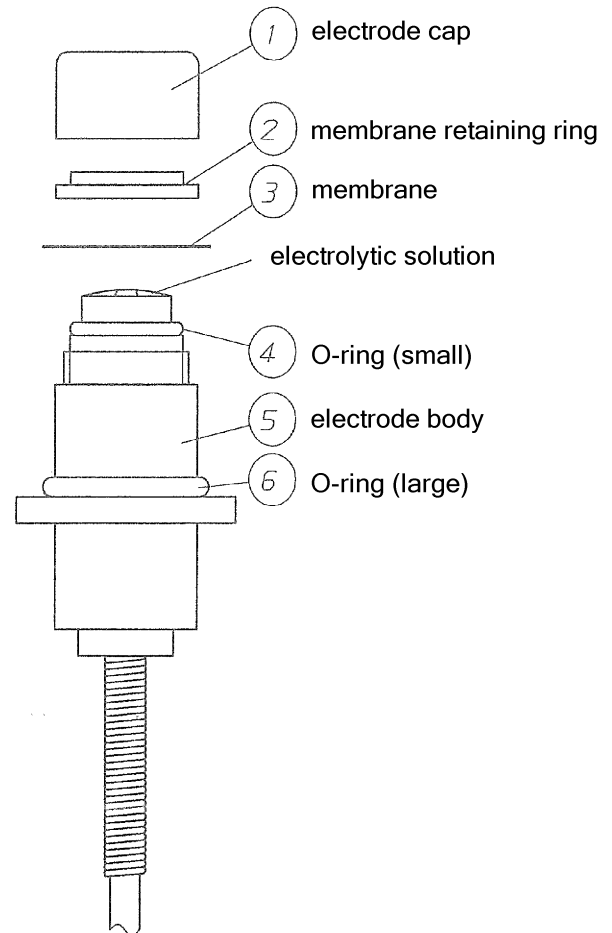
When replacing the batteries, replace them as a set.

* DO-32A does not have a data backup function.

If you replace the battery without connecting to the AC adapter, calibration data and settings will be erased.

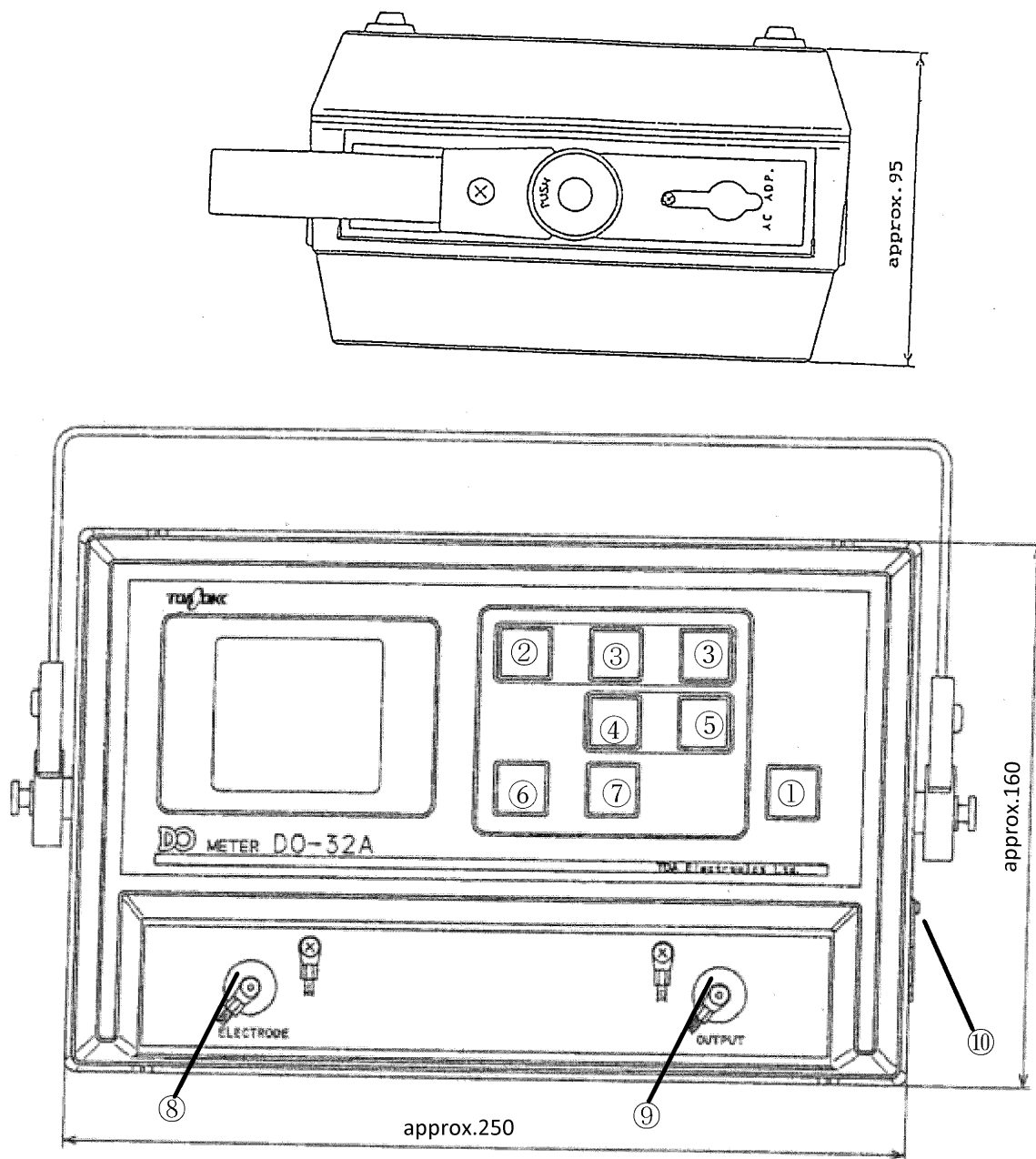
6. How to fill the electrolytic solution and replace the membrane

- 1) Disconnect the electrode from DO-32A main body, remove the electrode cap, the membrane retaining ring, and the old membrane from the electrode body, and finally, throw away the electrolytic solution.
- 2) Remove the O-ring (small) from the electrode body, wash these parts other than the electrode body with pure water, then wipe off the water remaining on these parts.
- 3) Attach the O-ring (small) to the electrode body.
- 4) Wash the inside of the electrode body with electrolytic solution, and then inject it. At this time, inject the electrolytic solution so that it rises slightly due to surface tension.
- 5) Place the new membrane on top of the electrolytic solution, push in the membrane retaining ring, and stretch the membrane. If there are bubbles, repeat step 4) and 5).
- 6) Place the electrode cap on top and tighten. Wash away any overflowing electrolytic solution with pure water.



7. External drawing

main body



- | | |
|------------------------|------------------------|
| ① POWER key | ⑥ AUTO HOLD key |
| ② RANGE AUTO/MANU. key | ⑦ L.S.D. ON/OFF key |
| ③ ↑ key, ↓ key | ⑧ ELECTRODE terminal |
| ④ CAL. key | ⑨ OUTPUT terminal |
| ⑤ CLEAR key | ⑩ AC adapter connector |

Flow cell section

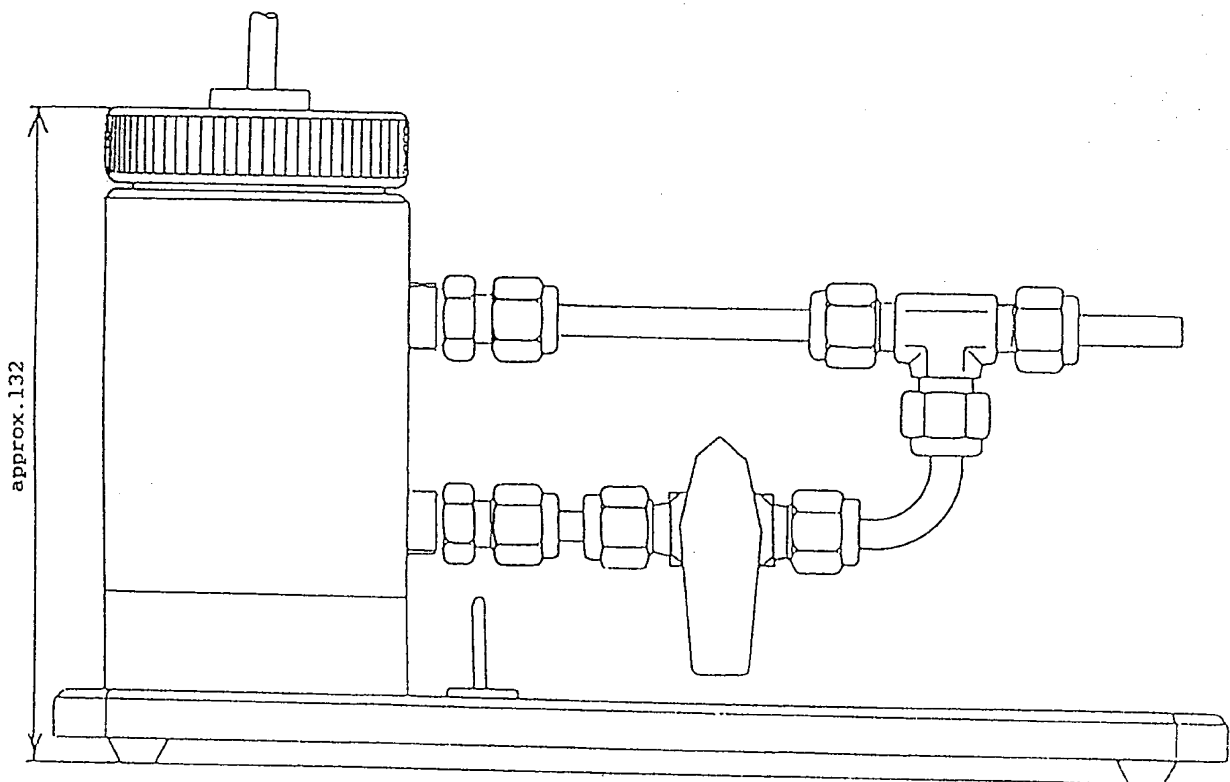
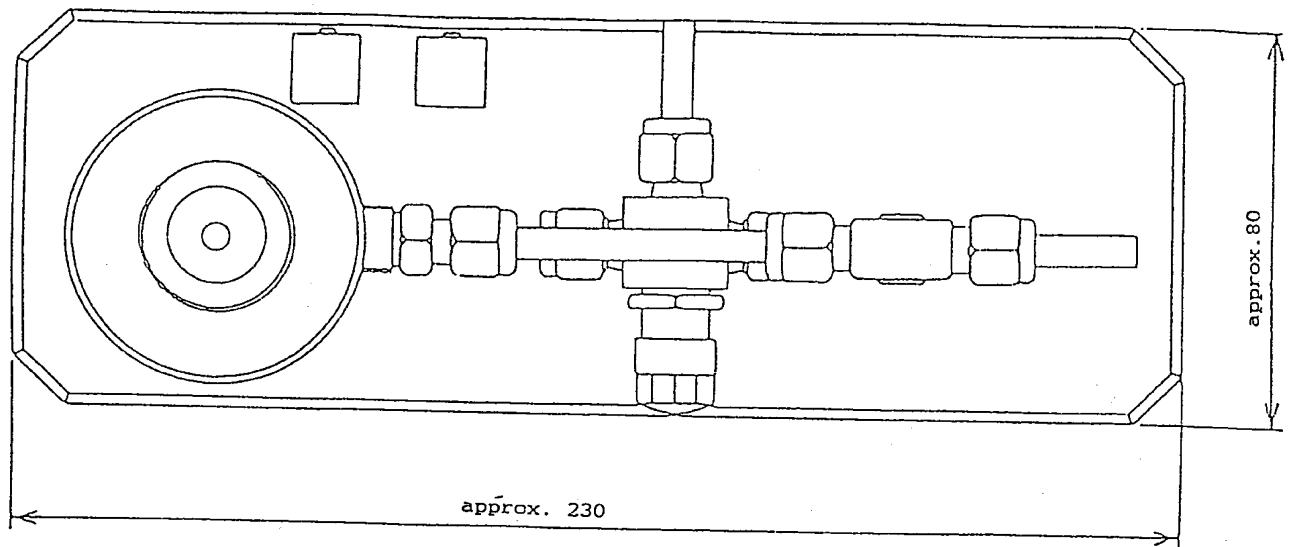


Table of quantity of saturated DO in water
(Old Japanese Industrial Standards)

JISK 0102-1986

Quantity of saturated DO in water

Temp. (°C)	Qauntity of chlorine ion in water (ppm)					Qauntity of DO to be deduced per 100ppm of chlorine ion
	0	5000	10000	15000	20000	
	Quantity of DO (ppm)					
0	14.16	13.40	12.63	11.87	11.10	0.0153
1	13.77	13.03	12.29	11.55	10.80	0.0148
2	13.40	12.68	11.97	11.25	10.52	0.0144
3	13.04	12.35	11.65	10.95	10.25	0.0140
4	12.70	12.03	11.35	10.67	9.99	0.0135
5	12.37	11.72	11.06	10.40	9.74	0.0131
6	12.06	11.42	10.79	10.15	9.51	0.0128
7	11.75	11.15	10.52	9.90	9.28	0.0124
8	11.47	10.87	10.27	9.67	9.06	0.0120
9	11.19	10.61	10.03	9.44	8.85	0.0117
10	10.92	10.36	9.79	9.23	8.66	0.0113
11	10.67	10.12	9.57	9.02	8.47	0.0110
12	10.43	9.90	9.36	8.82	8.29	0.0107
13	10.20	9.68	9.16	8.64	8.11	0.0104
14	9.97	9.47	8.97	8.46	7.95	0.0101
15	9.76	9.27	8.78	8.29	7.79	0.0099
16	9.56	9.06	8.60	8.12	7.63	0.0096
17	9.37	8.90	8.44	7.97	7.49	0.0094
18	9.18	8.73	8.27	7.82	7.36	0.0091
19	9.01	8.57	8.12	7.67	7.22	0.0089
20	8.84	8.41	7.97	7.54	7.10	0.0087
21	8.68	8.26	7.83	7.40	6.97	0.0086
22	8.53	8.11	7.70	7.26	6.85	0.0084
23	8.39	7.98	7.57	7.16	6.74	0.0082
24	8.25	7.85	7.44	7.04	6.65	0.0081
25	8.11	7.72	7.32	6.95	6.52	0.0079
26	7.99	7.60	7.21	6.82	6.42	0.0078
27	7.87	7.48	7.10	6.71	6.32	0.0077
28	7.75	7.37	6.99	6.61	6.22	0.0076
29	7.64	7.26	6.88	6.51	6.12	0.0076
30	7.53	7.16	6.78	6.41	6.03	0.0075
31	7.43	7.06	6.66	6.31	5.93	0.0075
32	7.32	6.96	6.59	6.21	5.84	0.0074
33	7.23	6.86	6.49	6.12	5.75	0.0074
34	7.13	6.77	6.40	6.03	5.65	0.0074
35	7.04	6.67	6.30	5.93	5.56	0.0074

DO-32A displays the old JIS values.

Revision History

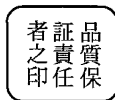
Instruction Manual No. DO3-AA13800E	19/03/2009 (FAN)	New Version in English (Code No.: 145N269)
AA13801*E	11/12/2024 (RSL)	(RSL Arakawa)



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TEST CERTIFICATE

この製品が当社の厳密な検査に合格し、
製品仕様を満足していることを証明します。

We certify that product has tested
in the company's standard and passed



東亜ディーケーケー株式会社
DKK-TOA CORPORATION



DKK-TOA CORPORATION

Head Office Address: 29-10, 1-Chome, Takadanobaba, Shinjuku-Ku, Tokyo, 169-8648 Japan

Telephone: +81-3-3202-0225 Facsimile: +81-3-3202-5685

URL <http://www.toadkk.co.jp/>